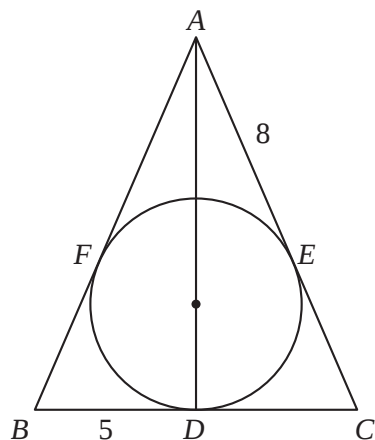


A12 Circles Hard Questions

O Level P2

1(a)



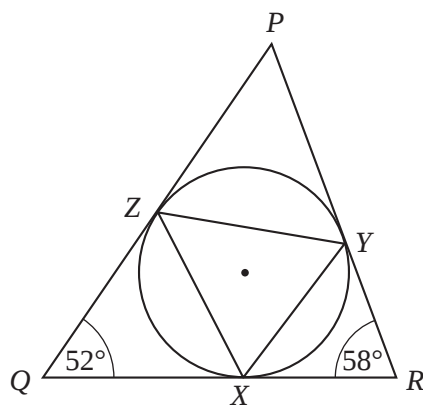
The diagram shows a circle which passes through D , E and F .
 AFB , BDC and CEA are tangents to the circle.
 D is the midpoint of BC .

Given that $BD = 5$ cm and $AE = 8$ cm, find

(i) EC , [1]

(ii) $\hat{CAD}$. [2]

(b)



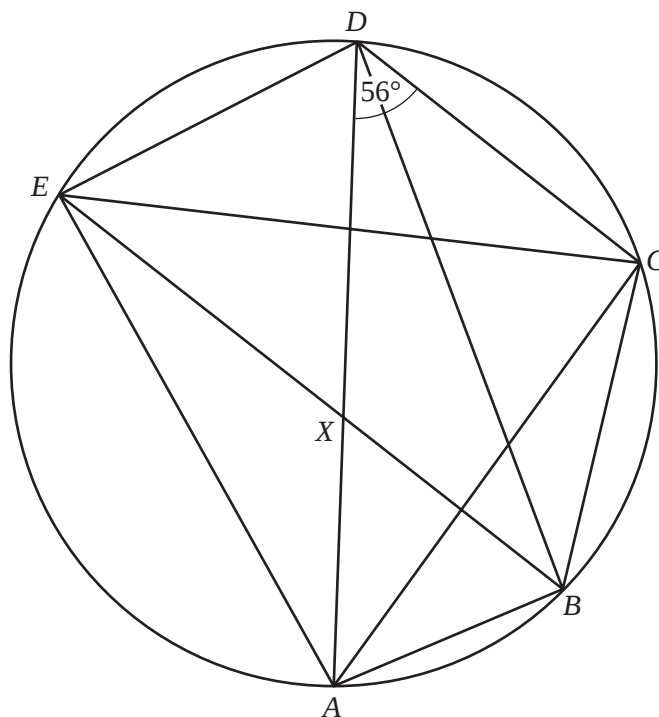
The diagram shows a circle which passes through X , Y and Z .
 PZQ , QXR and RYP are tangents to the circle.

Given that $\hat{PQR} = 52^\circ$ and $\hat{QRP} = 58^\circ$, calculate

(i) $\hat{QPR}$, [1]

(ii) $\hat{QZX}$, [2]

(iii) $\hat{ZXY}$. [2]



The points A , B , C , D and E lie on a circle.

AD is a diameter of the circle.

DB bisects angle ADC .

Angle $ADC = 56^\circ$.

(a) Giving your reasons, write down

(i) angle DCA , [1]

(ii) angle DAC , [1]

(iii) angle CBA , [1]

(iv) angle AEB . [1]

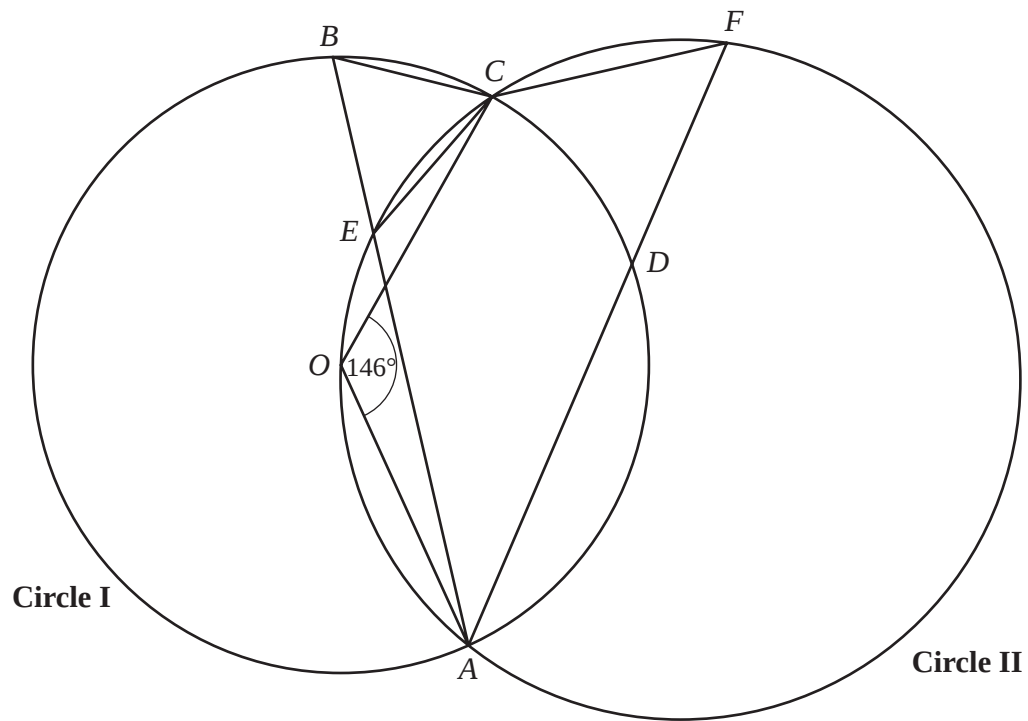
(b) It is given that EB is parallel to DC and that EB cuts AD at X .
[You **must not** assume that X is the centre of the circle.]

Show that triangle BDX is isosceles. [2]

(c) Find angle EBA . [1]

(d) Hence or otherwise show that X is the centre of the circle. [1]

3 (c)



Points A , B , C and D lie on **Circle I**.

O is the centre of **Circle I**.

Points A , O , E , C and F lie on **Circle II**.

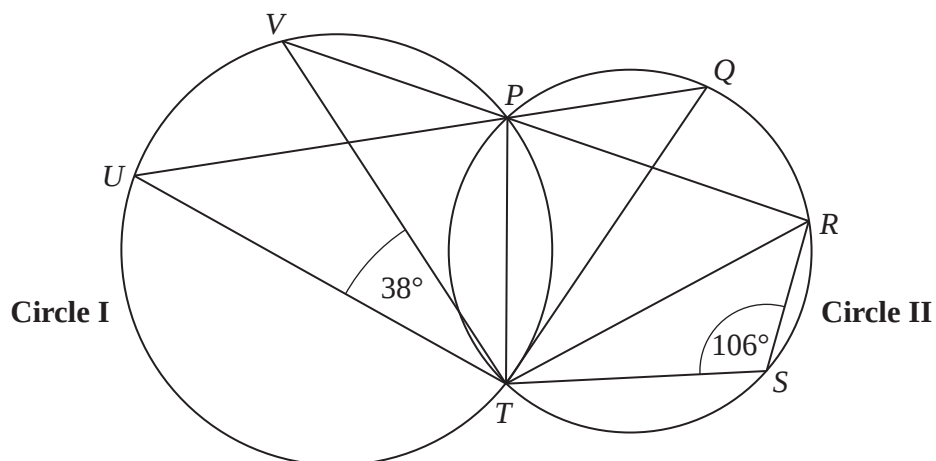
AEB and ADF are straight lines.

Angle $AOC = 146^\circ$.

Giving your reasons, write down

- | | |
|---------------------|-----|
| (i) $\hat{CEA}$, | [1] |
| (ii) $\hat{CBA}$, | [1] |
| (iii) $\hat{CFA}$, | [1] |
| (iv) $\hat{DCF}$. | [1] |

4 (a)

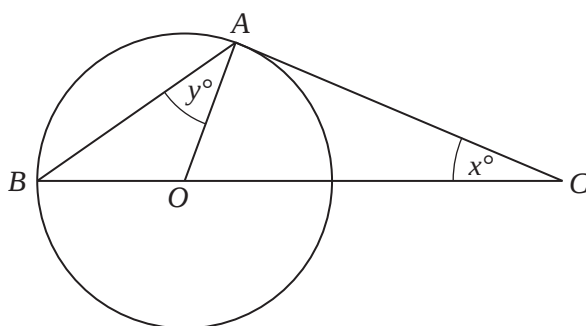


The points P , T , U and V lie on **Circle I**, and the points P , Q , R , S and T lie on **Circle II**.
 UPQ and VPR are straight lines.
 $\hat{VTU} = 38^\circ$ and $\hat{TSR} = 106^\circ$.

Find

- | | |
|--------------------------|-----|
| (i) $\hat{VP}U$, | [1] |
| (ii) $\hat{Q}T\hat{R}$, | [1] |
| (iii) $\hat{TP}R$, | [1] |
| (iv) $\hat{UPT}$. | [1] |

(b)

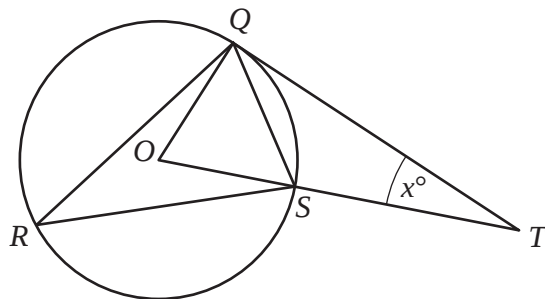


A and B are points on the circle, centre O .
 CA is a tangent at A and BOC is a straight line.
 $\hat{ACB} = x^\circ$ and $\hat{BAO} = y^\circ$.

Find an expression for y in terms of x .

[3]

5 (b)



Q, R and S are points on a circle, centre O .
 QT is the tangent at Q and $\hat{QTO} = x^\circ$.

(i) (a) Show that $\hat{QRS}$ is $\frac{1}{2}(90 - x)$.

[1]

(b) Find an expression, in terms of x , for $\hat{OQS}$.

Answer [2]

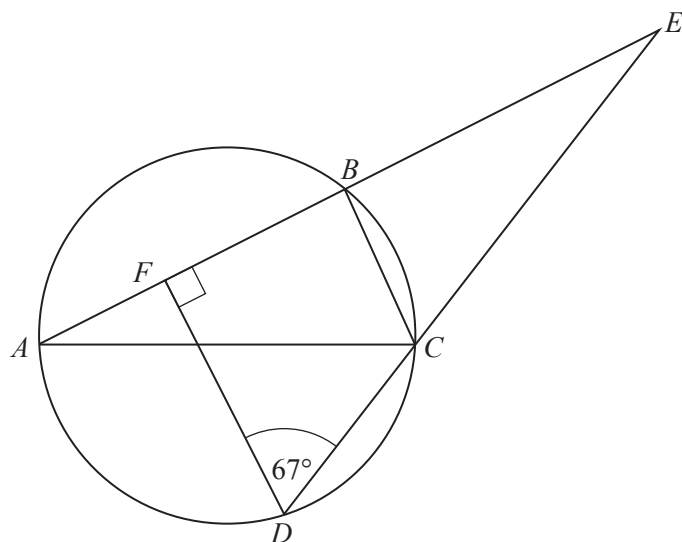
(ii) It is given that three times $\hat{QRS}$ is twice $\hat{OQS}$.

(a) Show that $180 + 2x = 270 - 3x$.

[2]

(b) Hence find $\hat{QTO}$.

Answer [1]



A, B, C and D are points on the circumference of the circle and AC is a diameter.
 $AFBE$ and DCE are straight lines.
 DF is perpendicular to AE and $\hat{CDF} = 67^\circ$.

(i) Find $\hat{AED}$.

Answer $\hat{AED} = \dots\dots\dots$ [1]

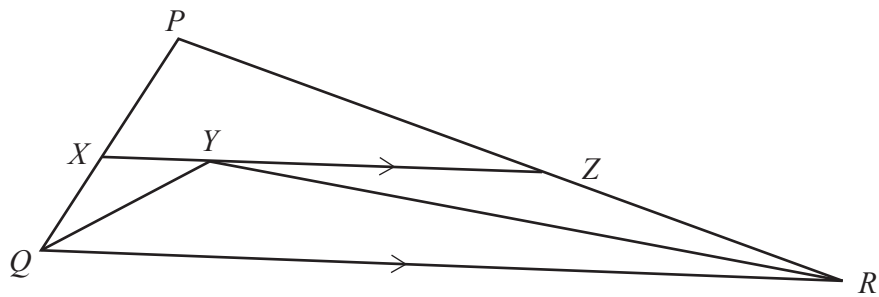
(ii) Find $\hat{CBE}$, giving a reason for your answer.

Answer $\hat{CBE} = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [1]

(iii) Explain why DF is parallel to CB .

Answer $\dots\dots\dots$
 $\dots\dots\dots$ [1]

(b)

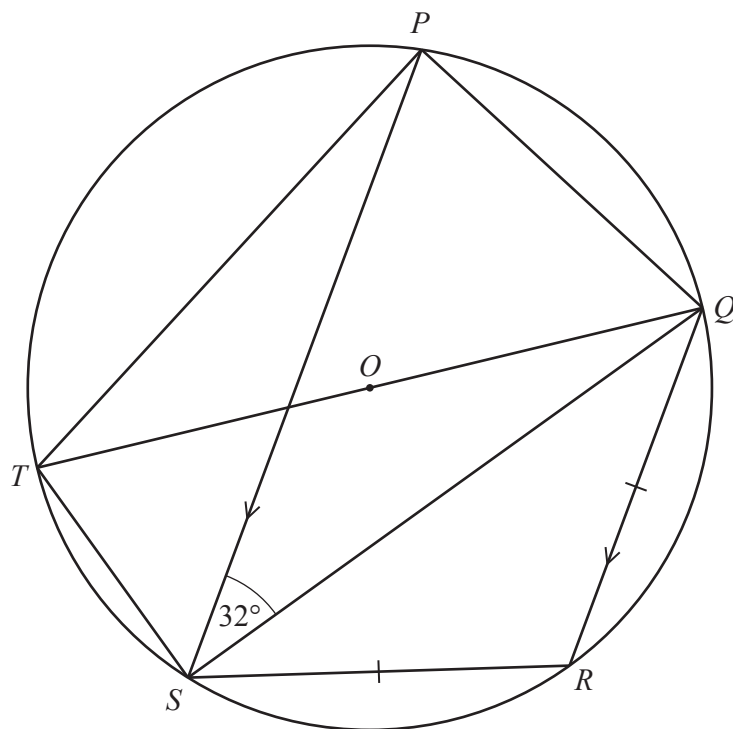


In the triangle PQR , the bisectors of $\hat{P}QR$ and $\hat{P}RQ$ intersect at Y .
The straight line XYZ is parallel to QR .

Prove that the perimeter of triangle $PXZ = PQ + PR$.

[3]

7 (b)



NOT TO
SCALE

P, Q, R, S and T are points on the circumference of a circle, centre O .
 $\angle PSQ = 32^\circ$ and O lies on TQ .
 PS is parallel to QR and $QR = RS$.

- (i) Find $\angle PQT$.
 Give a reason for each step of your working.

.....

.....

.....

$\angle PQT = \dots\dots\dots$ [3]

- (ii) Find $\angle QRS$.

$\angle QRS = \dots\dots\dots$ [2]

- (iii) Find $\angle TQS$.

$\angle TQS = \dots\dots\dots$ [1]